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### **ENHANCED, DOWNLINK-CAPABLE, FIRE-DATA GATHERING AND MONITORING**

#### **Cross Reference to Related Application**

This application claims priority to prior-filed, currently copending U.S. Provisional Patent Application Serial No. 60/456,958, filed March 23, 2003 for “Enhanced, Downlink-Capable, Fire-Data Gathering and Monitoring” by David A. Johnson. The entire contents of that provisional application are hereby incorporated herein by reference.

#### **Background and Summary of the Invention**

This invention pertains to ground-fire management, and in particular to an airborne method which results in the digital transmission, to a suitable ground station, of ground fire perimeter data including different isothermal conditions that lie along the length of such a line, accompanied by so-called critical-alignment data derived from information collected immediately adjacent an airborne location which can be used commonly to prioritize and focus the utilization of ground-fire fighting resources at plural, different regions along a fire perimeter. A preferred embodiment of and manner of practicing the present invention are described in conjunction with gathering data from an a vertically remote airborne support platform, such as the frame of an over-flying helicopter, a situation in which the present invention has been found to offer particular utility.

Prior-issued U.S. Patent No. 5,160,842, issued on November 3, 1992, describes what is referred to in that patent as infrared fire-perimeter mapping. This patent describes the background against which the present invention has been created. In that patent, the entirety of which is hereby incorporated herein by reference, a system and a methodology are described wherein an over-flying aircraft, such as a helicopter, acquires

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both thermal and optical data which is positionally coordinated, and aimed at producing data streams that allow for the overlay printing, if so desired, on a common topographic map, for example, of the observed perimeter line of a ground fire, with that line marked or distinguished in any suitable manner along regions of its length to highlight different isothermal conditions existing along that line.

The present invention augments the structure and methodology disclosed in that patent in several significant ways. To begin with, the apparatus of the present invention is constructed in such a fashion that a thermal imager and an optical imager carried in an over-flying airborne structure, such as a helicopter, can be angulated to an infinite different number of angles about a gravity line axis, and can also be tilted upwardly and downwardly through an infinite number of angles. This arrangement allows for the easy overhead observation of many regions along a fire line from a substantially common overhead location.

Another very important feature of the present invention is that the system and methodology of the invention propose the gathering from immediately adjacent the airborne structure of so-called critical-alignment data which include air temperature, relative humidity, and wind speed and direction. GPS data is also integrated with all captured data so that the relative positions between a particular point along a fire line, and the site of the observing overhead structure, are known quite accurately in space relative to one another. Critical-alignment data is that important collection of data which, when combined with fire perimeter isothermal data, can significantly aid in the direction and utilization of best-available fire fighting resources to deal with conditions along a fire line that need priority attention.

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appropriate fashion when called for. The flags may be associated, as an illustration, with detailed text further describing conditions at the marked locations, and such text materials are shown generally at 62b, 64b, 66b in Fig. 3.

An illustration of critical-alignment information/conditions which might result in priority flagging along fire line 48, say in the vicinity of point, or region 48a, is as follows:

- (a) Fire-line isothermal temperature - 470°F
- (b) Air temperature - 90°F
- (c) Relative humidity - 17%
- (d) Wind speed - 10-knots
- (e) Wind direction - North, into new fuel

From the above description of the invention, the steps involved in practice of the invention are seen to include:

1. Gathering thermal and optical fire-line data along a substantially common line-of-sight which can be adjusted infinitely to occupy different angles in space.
2. Noting the angular disposition in space of such a line-of-sight.
3. Gathering critical-alignment atmospheric data, including air temperature relative humidity, and wind speed and direction.
4. Noting the distance from the observation site to an observed location along a fire-line perimeter.
5. ~~Associated~~ Associating with all of the above data relevant GPS information.